Instruction Manual

REGULATED HIGH VOLTAGE SUPPLY

Model RE-3002

Ser. No. 389

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NORTHEAST SCIENTIFIC CORPORATION
ACTON MASSACHUSETTS

Instruction Manual

REGULATED HIGH VOLTAGE SUPPLY

Model RE-3002

Ser. No. 389

Northeast Scientific Corporation

30 Wetherbee Street

Acton, Massachusetts

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DANGER

WARNING

The output power and voltage level from this equipment can be high enough to kill or at least to cause serious injury. For this reason, the supply should always be operated completely enclosed, i.e., with the case on, and every care should be taken to avoid personal contact with the output leads or with the load being fed by the supply during the time that it is operating.

Although the equipment should be perfectly safe when the filaments only are energized (power switch in ST'D BY position), a good rule to follow is to turn it off completely when it is necessary to make adjustments that require personal contact with leads and components at a high potential with their surroundings.

REMEMBER

NO LIGHTS:	Completely off.
Amber or ONE LIGHT:	Stand-by position, filaments only applied.
Red and amber or TWO LIGHTS	HIGH VOLTAGE ON. BE CAREFUL.

Model RE-3002

SPECIFICATIONS

Output Voltage: 0.5 to 3 KV DC, continuously variable in steps of 500 and 50 volts in conjunction with a 0 to 60 volt vernier. Output is the sum of the dial settings to within 2%.

Output Current: 0 to 20 milliamperes, full-load.

Polarity: Either side of the output may be grounded.

Ripple: Less than 2 millivolts peak to peak.

Regulation: Better than .005% no-load to full-load at 3 KV output.

Internal Impedance: 2 ohms at DC, 0.3 ohms in series with approximately 45 microhenries to 2000 CPS, under 2.5 ohms to 1 Mc./Sec., measured at 3 KV with 20 milliampere load.

Stability: .01% or better for a line voltage shift from 105 to 125 V AC.

Long-term Stability: .01% per hour, 0.1% per day after warm-up when in a reasonable constant ambient temperature without sudden and/or wide temperature fluctuations.

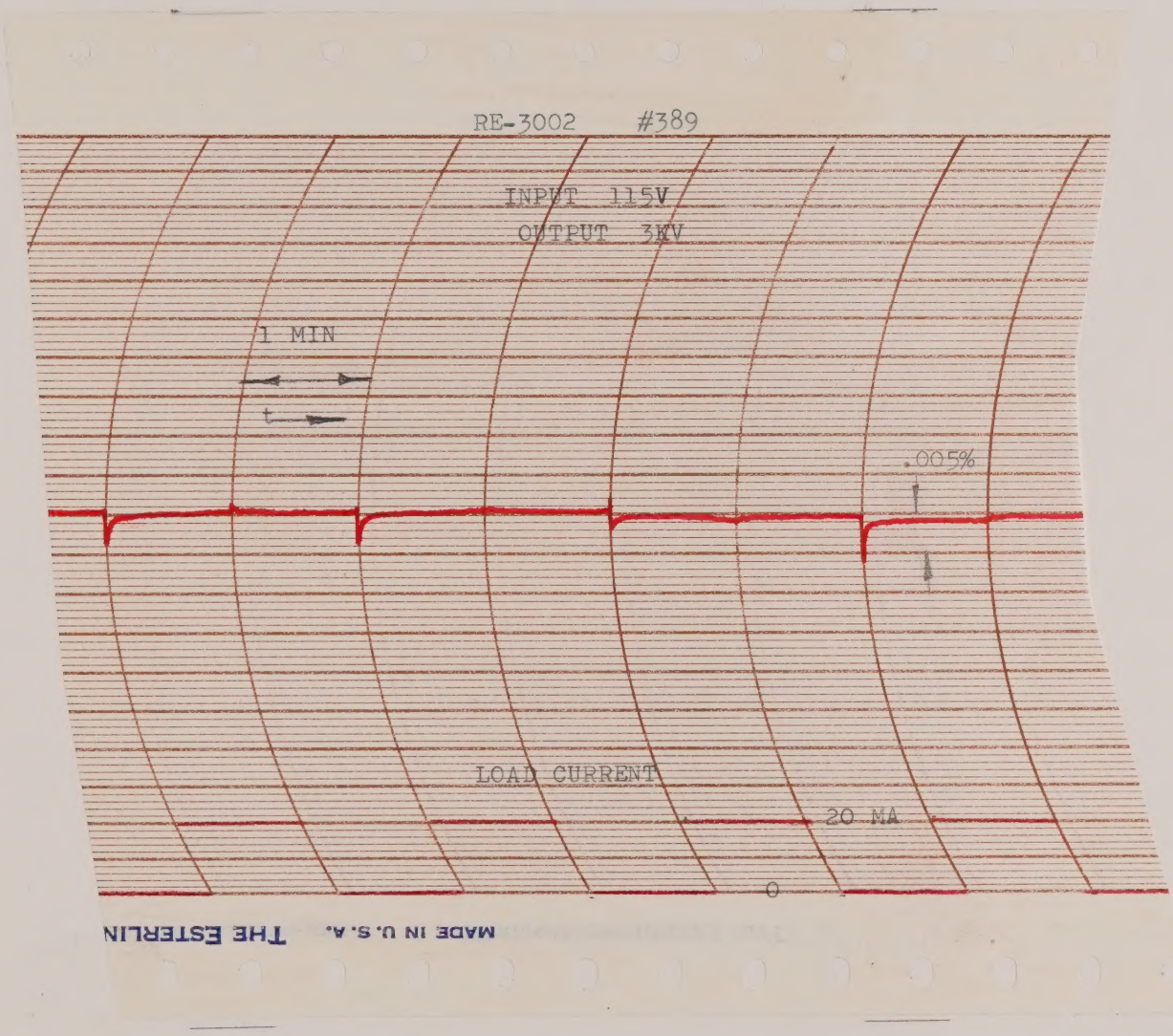
Input: 105 to 125 V AC, 50 to 70 CPS, 1.3 amps. max., 130 watts max.

Terminals: Output: Clear plastic plate with insulated binding posts at back.
Input: 3 wire grounding male AC chassis connector at back used with a detachable 3 wire grounding type power cord

Tubes: 3 12AX7, 1 6BG6-GA, 5 5651.

Dimensions: 8-3/4" high by 19" wide by 12-1/2" deep overall. The cabinet alone is 10-5/8" deep.

Net Weight: 26 pounds.


RE-3002 #389
INPUT 115V
OUTPUT 3KV
1 MIN
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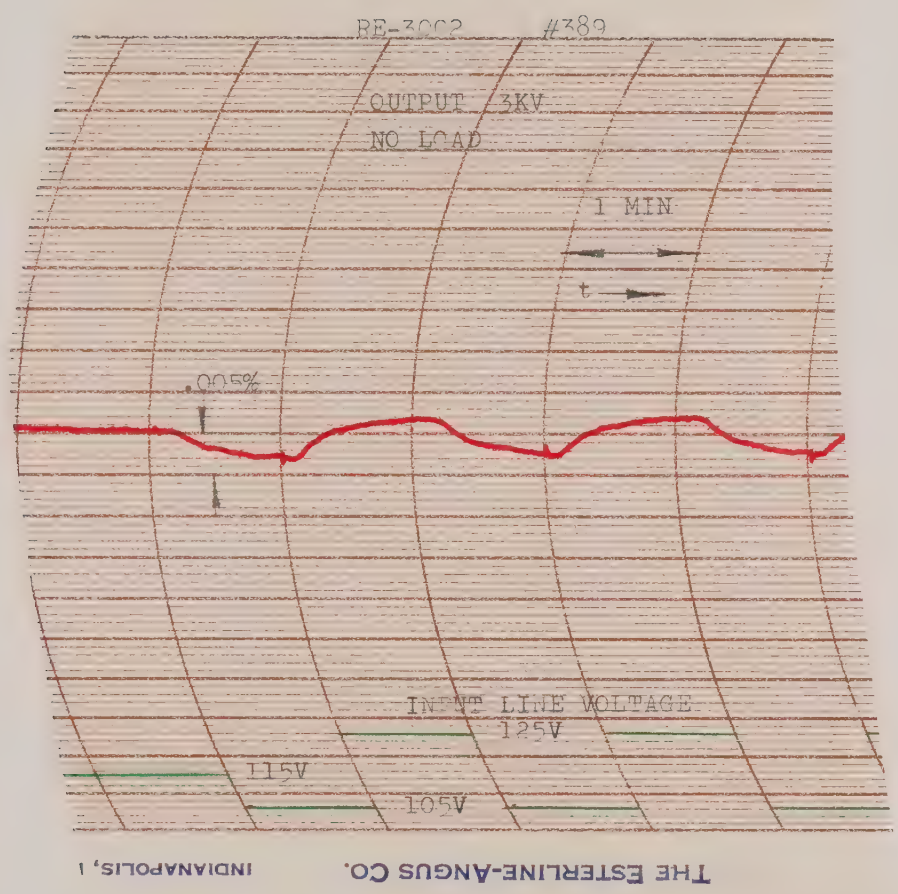
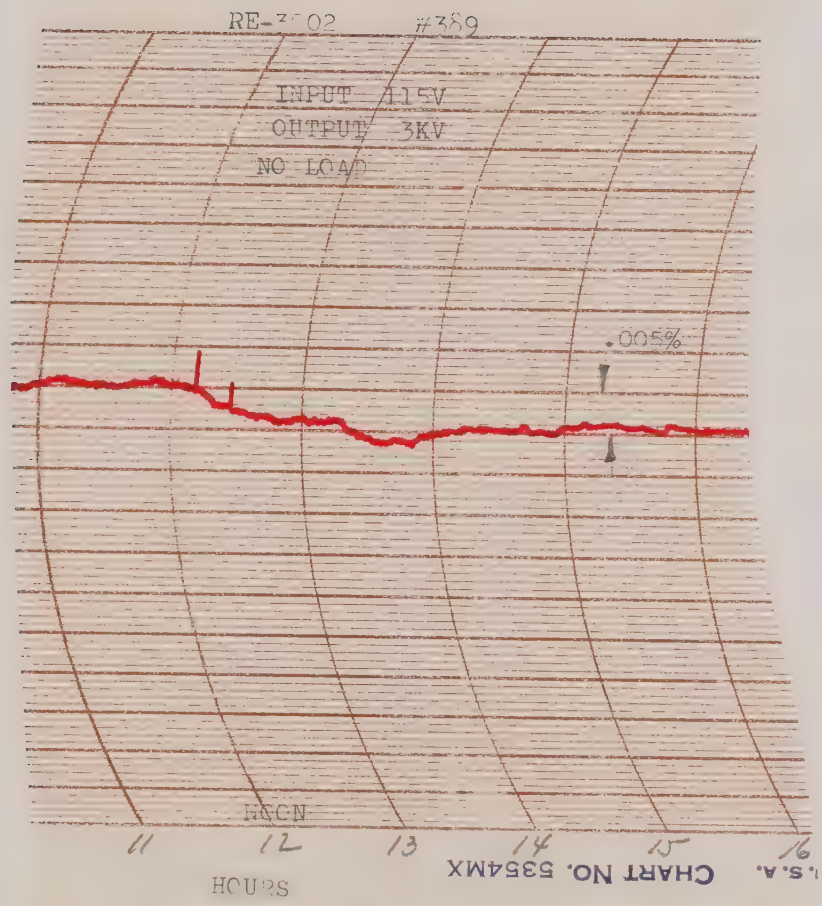
.005%
LOAD CURRENT
20 MA
0
MADE IN U.S.A. THE ESTERLIN

Regulation


RE-3002 #389
OUTPUT 3KV
NO LOAD
1 MIN
t
.005%
INPUT LINE VOLTAGE
125V
115V
105V
THE ESTERLINE-ANGUS CO.
INDIANAPOLIS, I

Stability



Long-term Stability

I

GENERAL DESCRIPTION

The instrument consists of a high-voltage rectifier followed by a degenerative regulator arranged to supply a closely regulated source of high voltage to a load. Either side of the output may be grounded.

The supply is completely AC operated and self-contained. It is compactly housed in a ventilated cabinet designed for relay-rack or bench use. All the operating controls are mounted on the front panel. The output terminals and the input power receptacle for the power cord are located at the back of the instrument.

The power switch is arranged so that the filaments must be turned on first. The high voltage may then be turned on and off without the necessity of waiting for a warm-up period.

The high-voltage rectifier is a full-wave silicon doubler. A minimum of filter is used in order to keep the energy storage low. The AC voltage input to the rectifier is reduced as the output voltage is lowered, so that the power dissipated in the regulator is kept down.

The regulator is of the degenerative series type. The control stage is operated as a tetrode, permitting large plate voltage excursions to be applied by the rectifier. A two-stage balanced high-gain differential amplifier compares part of the output voltage with a constant reference and applies the amplified voltage difference to the control stage so that the output voltage is held within narrow limits, almost independent of output load current or input line voltage effects.

The output voltage is continuously adjustable over the entire range from 500 to 3000 volts, and it is changed by varying the feedback ratio. The ratio is changed by switching precision resistors, making the output voltage calibration about as accurate as the resistors used. These resistors are deposited carbon types that have good stability.

All the tubes used in the equipment are popular types, for which there should be no replacement problem in the event of their failure.

RE-3002/4/6 OCTOBER 12, 1961

II

OPERATING INSTRUCTIONS

The supply may be operated in any normal location, if it is adequately protected from moisture and excess dirt. If the instrument has been exposed to dampness, it should be opened and left in a warm dry place until it is thoroughly dry before being operated.

To prevent overheating, it is important that a reasonable area of the ventilated cover be exposed so that there will be adequate ventilation, especially that area over the tubes. Otherwise the heat generated by the rectifier and regulator may raise the operating temperature too high.

Although the supply has been constructed with care and all components are well supported, excessive vibration and rough handling should be avoided.

The holes at the edges of the panel are properly located for relay-rack mounting. If, on the other hand, the supply is to be used on the bench, four rubber feet are provided, which attach at the four holes at the corners of the bottom plate. Usually, the unit is shipped with these feet attached, and they should be removed, if the supply is rack mounted, so that they will not interfere with other units that may be mounted below it in the rack.

Because of the very nature of equipment of this kind, the supply should always be operated with the top cover and bottom plate in place. The warning given at the beginning of this manual is repeated:

WARNING

The output voltage and power levels from this supply are high enough to kill, or at least to cause serious and permanent injury. For this reason, the supply should only be operated when completely enclosed, i.e., all covers on, and every care should be taken to avoid personal contact with the output or load being fed by the supply during the time it is operating.

Although the supply is perfectly safe when only the filaments alone are energized, a good rule to follow is to turn off the supply completely when it is necessary to make adjustments that will require in some way bodily contact with leads at high potential.

REMEMBER

NO LIGHTS: Supply is completely OFF.

YELLOW or ONE LIGHT: Filaments only are on.

RED AND YELLOW or TWO LIGHTS: High voltage ON. BE CAREFUL.

It is suggested that the supply be placed in operation in the following steps:

1. Check to see that the power switch is in the "OFF" position.

2. Connect the load to be fed to the output terminals. If one side of the output is to be grounded, connect a jumper between that output post and the center or ground post. This post is connected internally to the chassis.

3. The output voltage can be set to the proper or some convenient value by adjusting the three right-hand controls. The operating output voltage will be the sum of the dial readings. For instance, if 1640 volts are needed, set the switches to 1500 and 100 and the vernier to 40.

4. Insert the power cord into the AC connector at the back of the unit. Plug it into some convenient outlet of 105 to 125 volts, 50 to 500 cycle AC power.

5. Advance the power switch to the "ST'D BY" or center position. The bottom or amber pilot should light, indicating that power has been applied to the filaments. Check this the first time the supply is operated after shipment by looking at the tubes through the perforations in the cover. The three 12AX7's should be quite dim, since they are operated on low voltage, but they should glow somewhat. Allow about 60 seconds for the cathodes to warm-up completely.

6. After the required warm-up time, advance the power switch to the "ON" or third position. High voltage is now on and the top or red pilot should indicate this. Both pilots are now on, indicating that power can flow to a load.

If the supply is being operated for the first time or has not been operated for some months, set the output voltage to the lowest setting (500 volts) initially. After a few minutes of operation the voltage can be increased.

7. The high voltage can be adjusted, if desired, while the supply is operating, by changing the output voltage control settings. The switches shift the output voltage in 500 and 50 volt steps and the vernier gives a 0 to 60 volt variation for the voltages in between these steps.

The supply will continue to regulate the output so long as the rated load current (20 Ma.) is not exceeded and the line voltage at full-load does not fall below 105 volts. At less than full-load the regulator will continue to perform at even lower voltages. The output voltage for regulation will depend upon the output voltage setting and the load current being drawn. Generally, for any output voltage, the less the load current, the lower the line voltage can be before regulation ceases. Usually, at no-load, the supply will continue to perform at line voltages as low as 70 to 80 volts. However, the amplifier cathodes may be too cool to give the best performance, which is obtained at the rated input line voltage.

RE-3002/4/6/3010 MARCH 26, 1962

INTERLOCK BARRIER STRIP

At the back of the chassis is a two-terminal barrier strip so that the unit can be interconnected with an interlock circuit. This instrument is shipped with these two terminals connected. If it is desired to use them in an external protective circuit, remove the jumper and connect the external circuitry to them.

These two terminals are in series with the switching to the primary circuits, when the high voltage is turned on. It is necessary, therefore, to connect them together when they are not connected to an external normally closed interlock circuit, so that the unit will be turned on when desired.

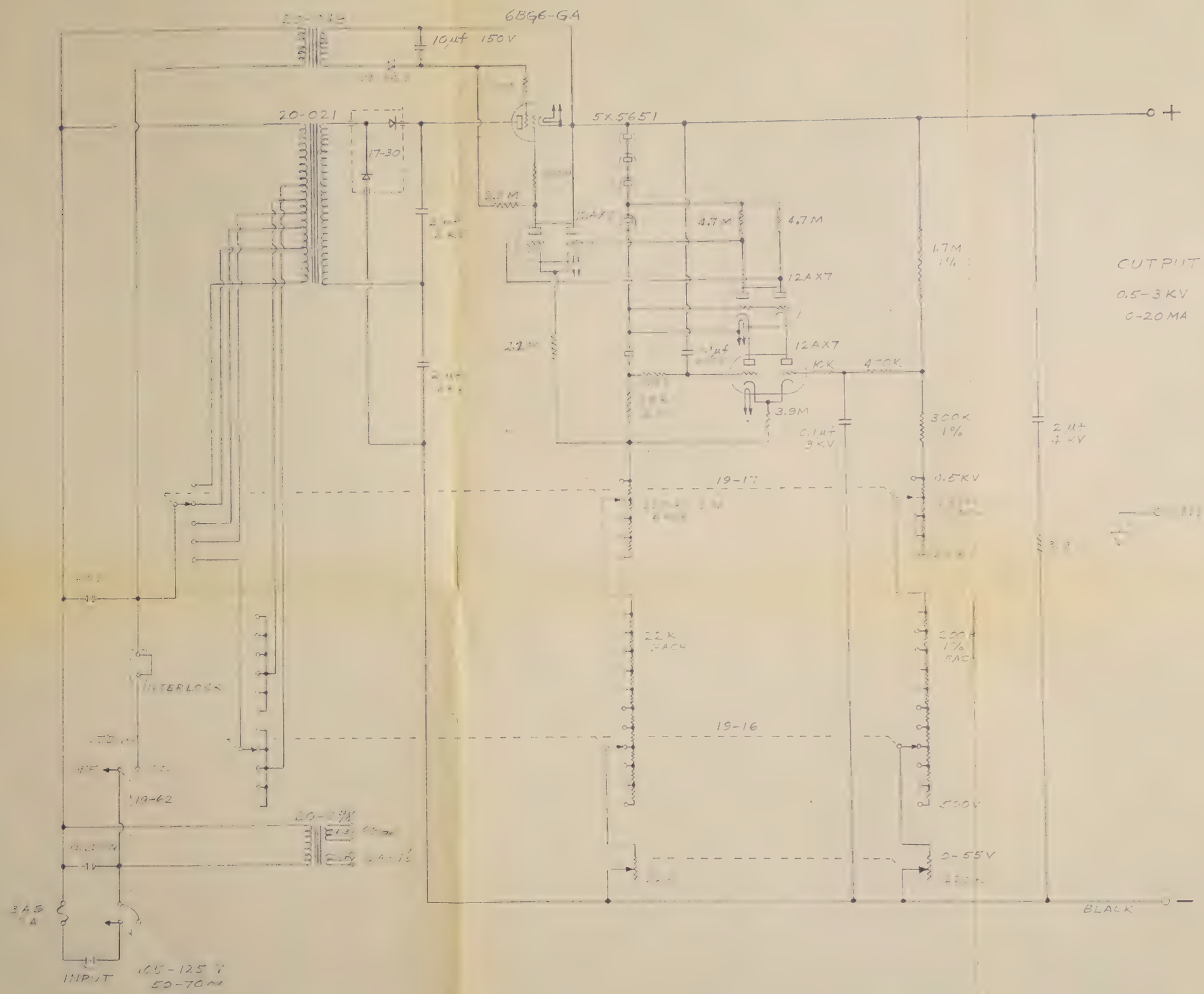
REGULATED HIGH VOLTAGE SUPPLY

MODEL RE-3002

NORTHEAST SCIENTIFIC CORP.

ACTON, MASS.

RE-



WARRANTY

This instrument is guaranteed to the original purchaser to be free of defects in material and workmanship for a period of six (6) months from the date of shipment. Our responsibility under this warranty is limited to the repair or replacement of the instrument or any defective part thereof.

Our responsibility will cease and the conditions of this warranty will be considered to have been voided if any electrical connection or wiring has been disconnected, even though reconnected, or any electrical or physical modifications made, these actions having been taken by or for any person other than our authorized representatives and without our express authorization, or if the instrument has been subjected to abuse or to conditions other than those of ordinary wear and usage, or operated in any manner other than according to the operating instructions in the instruction manual.

For service under this warranty, please advise us promptly of the details pertinent to the failure.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THOSE SET FORTH HEREIN AND THE DESCRIPTION OF THE INSTRUMENT.

IMPORTANT

When notifying us regarding any Northeast Scientific instrument, please give us the serial and model number.

REGULATED HIGH VOLTAGE SUPPLY

200 to 1600 Volts

30 MA MODEL RE-1601

Uses: This supply provides a regulated output voltage over a wide range. The output voltage is stable and contains very low ripple. Either side of the output may be grounded and as much as 30 Ma. full-load current is available. The unit is small and light for easy portability so that it is very useful as a utility instrument about the laboratory or plant.

Typical uses include those in circuit development and operation with klystrons, photomultipliers, traveling wave tubes and backward wave oscillators, set ups for the determination of the characteristics of condensers, resistors, and other components, and many other problems in the laboratory and at the test position.

FEATURES

- Very wide voltage range, 200 to 1600 volts.
- Either positive or negative may be grounded.
- 30 Ma. full-load current.
- Low internal impedance, 1.5 ohms at full-load at 1600 V.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability.
- Standard tubes: no replacement problem.
- Portable, compact, light weight.

MODEL RE-1601

Description: These instruments consist of a rectifier followed by an electronic regulator. *Either side of the output may be grounded.*

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

Long-term stability in such regulators is determined primarily by the comparison resistors in the sensitive parts of the regulator and the reference employed. Generally, deposited carbon resistors are used but wire-wound precision types can be included on special order when it is required. Type 5651 glow tubes are used for reference.

The output voltage is continuously variable over the entire range of 200 to 1600 volts. It is set by three front panel controls, the first a switch covering 200 to 1500 volts in 100 volt steps, a second covering 0 to 100 volts in 10 volt steps, and the third control a calibrated vernier with a continuous 0 to 12 volt range. The resulting output voltage is good to 2% of the sum of the dial readings.

This supply is completely AC operated and self-contained. The portable housing is ventilated and has a narrow front dimension in order to save bench space. The cover can be slipped off the unit by removing three screws. All operating controls are mounted on the front panel. The output terminals are three insulated binding posts on the front panel. The input line connection is made at the back with a detachable molded power cord. All the tubes used are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage — 200 to 1600 volts DC, ±2%, continuously variable.

Output Current — 0 to 30 Ma. full-load.

Polarity — Either side of the output may be grounded.

Ripple — 2 Mv. peak to peak maximum at line frequency.

Regulation — Better than .005% no-load to full-load at 1600 V output.

Internal Impedance — 1.5 ohms at DC, 0.15 ohms in series with approximately 40 microhenries to 1000 CPS, under 2 ohms to 1 Mc./Sec., measured at 1600 V output with 30 Ma. load.

Stability — .01% for input line voltage shift from 105 to 125 V AC at 1600 V output.

Long-term Stability — .02% per hour, 0.1% per day after warm-up at 1600 V output in a normal ambient temperature without sudden and wide temperature changes.

Input — 105 to 125 volts AC, 50 to 500 CPS, 0.6 Amps. max., 65 watts max.

Terminals — Output: Insulated binding posts on the front panel.

Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit.

Tubes — 2 12AX7, 2 5651, 1 6BG6-GA.

Construction — Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

Dimensions — Cabinet is 6" wide by 9" high by 13¾" deep. Handle extends ⅝" above top, feet ⅜" below bottom, knobs and binding posts ⅞" beyond front panel.

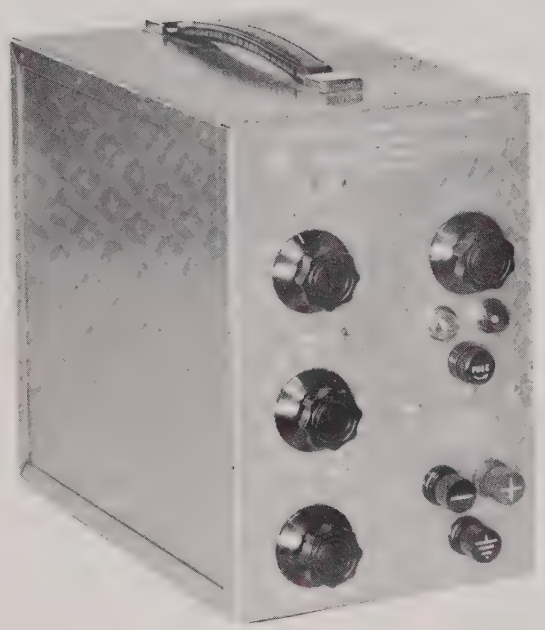
Net Weight — 17 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLY

300 - 1600 Volts

10 MA **MODEL RE-1602**



Uses: A very compact and light weight supply intended for general use about the laboratory, in the field, and at the test bench.

This supply has been designed to be as small and compact as possible consistent with a wide output voltage range, good performance, and useful current output capacity.

Typical uses include those in research work and circuit development with photomultipliers, klystrons, electron accelerators, component testing and evaluation, and many other applications where a stable and/or wide range DC voltage having optional polarity is needed.

FEATURES

- Very wide voltage range: 300 to 1600 volts.
- Either positive or negative may be grounded.
- 10 Ma. full-load current.
- Low internal impedance: about 1 ohm.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability.
- Standard tubes: no replacement problem.
- Portable: very compact and light weight.

MODEL RE-1602

Description: These instruments consist of a rectifier followed by an electronic regulator. *Either side of the output may be grounded.*

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

Long-term stability in such regulators is determined primarily by the comparison resistors in the sensitive parts of the regulator and the reference employed. Generally, deposited carbon resistors are used but wire-wound precision types can be included on special order when it is required. Type 5651 glow tubes are used for reference.

The output voltage is continuously variable over the entire range of 300 to 1600 volts. It is set by the three front panel controls, the first switch covering 300 to 1500 volts in 100 volt steps, the second from 0 to 100 volts in 10 volt steps, and the third control is a vernier giving an approximate 0 to 12 volt variation to fill in these steps. The resulting output voltage is the sum of the dial readings to an accuracy of 2%.

These light weight supplies are very compactly housed in a portable case so that they are easily carried to the spot at which they are to be used. The cabinet is ventilated and under normal operating circumstances the temperature rise of the unit is low. The supplies are completely AC operated and self contained. All tubes are popular types for which there should be no replacement problem.

All operating controls are mounted on the front panel along with the output terminals. The input connections are made through a detachable molded power cord fitting a standard AC connector at the back.

SPECIFICATIONS

Output Voltage — 300 to 1600 volts, ±2%, continuously variable.

Output Current — 0 to 10 Ma., full-load.

Polarity — Either side of the output may be grounded.

Ripple — Approximately 1 Mv. peak to peak.

Regulation — .005% no-load to full-load at 1600 volt output.

Internal Impedance — Approximately 1 ohm at DC, 0.15 ohm in series with approximately 35 michrohenries at 1000 CPS, under 4 ohms to 1 Mc/Sec., measured at full-load at 1600 volts output. At DC the impedance will decrease at lower output voltages.

Stability — .01% shift in output voltage at 1600 V for a line voltage shift from 105 to 125 V AC.

Long-term Stability — About .01% to .02% per hour, 0.1% to 0.2% per day after warm-up in a normal ambient temperature without wide and sudden temperature fluctuations.

Input — 105 to 125 V AC at a nominal 50 to 500 CPS 0.5 Amp. max., 50 watts max.

Terminals — Output: Insulated binding posts on the front panel.

Input: Detachable all rubber moulded power cord fitting a standard male AC chassis connector at the back.

Tubes — 2 12AX7, 3 5651, 1 6AV5

Construction — Light compact portable construction with leather carrying handle. Ventilated cover slips off the unit after removing three screws at the back. Gray hammertone finish with white marking. All controls and output connectors on the front panel.

Dimensions — Cabinet is 6" wide by 9" high by 10 5/8" deep. Handle extends 5/8" above top, feet 3/8" below bottom, knobs and binding posts 7/8" beyond front panel.

Net Weight — 12 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLY **10 MA** **MODEL RE-1603**

0.3 to 1.6 Kilovolts

This supply is electrically equivalent to the Model RE-1602, but has been constructed for rack mounting. This unit has been built very compactly so that rack space can be conserved. The cover can be removed from the back, without taking the supply out of the rack.

DIMENSIONS: 5-1/4" high by 19" wide by 10" deep overall.
Cabinet alone is 8-1/2" deep.

NET WEIGHT: 14 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLY

100 MA **MODEL RE-1610**

MODEL RE-1611

0.3 to 1.6 Kilovolts
0.2 to 1.6 Kilovolts

This instrument consists of a high voltage rectifier followed by a degenerative regulator arranged to supply a closely regulated source of high voltage to a load. Either side of the output may be grounded.

The supply is completely self-contained and AC operated. It is compactly housed in a ventilated cabinet designed for either relay-rack mounting or bench use. All the operating controls are mounted on the front panel. The output terminals and input power connection are located at the back of the cabinet.

The high voltage rectifier is a full-wave silicon doubler. A minimum of filter is used in order to keep the energy storage low, and this in turn helps to make the unit more compact. The AC input to the rectifier is reduced as the output voltage is lowered, so that the power lost in the control stage of the regulator is kept down. In this way, the dependability of the regulator is improved along with its performance.

The regulator is of the degenerative series type. The control stage is tetrode operated, permitting large voltage excursions to be applied by the rectifier. A balanced two-stage high-gain differential amplifier compares part of the output voltage with a constant reference and applies the amplified voltage difference to the control stage so that the output voltage is held within narrow limits, almost independent of output load current variations or input line voltage fluctuations.

The output voltage is continuously variable over the entire range from 0.3 to 1.6 kilovolts in steps of 100 and 10 volts in conjunction with a 0 to 12 volt vernier. The voltage is changed by changing the feedback ratio to the regulator, and the amplifier gain is high enough so that the output voltage is dependent mostly upon the accuracy of the reference and the resistors used in the network. The reference uses 5651 type glow tubes for their excellent long-term performance.

The power switch is arranged so that the filaments must be turned on first. After this, the high voltage may be turned on and off without having to wait through a warm-up period.

SPECIFICATIONS

Output Voltage - 0.3 to 1.6 KV DC, and 0.2 to 1.6 KV DC, continuously variable in steps of 100 and 10 volts in conjunction with a 0 to 12 volt vernier. The output voltage is within 2% of the sum of the dial settings.

Output Current - 0 to 100 milliamperes full-load.

Polarity - Either side of the output may be grounded.

Ripple - Under 2 millivolts peak to peak maximum.

Internal Impedance - Approximately 0.6 ohms at DC, no-load to full-load at 1.6 KV. At 100 cps, internal impedance is 0.1 ohm partly inductive.

Regulation - Better than .005% no-load to full-load at 1.6 KV output.

Stability - .01% or better for an input line voltage shift from 105 to 125 V AC at 1.6 KV output.

Long-term Stability - .01% per hour, 0.1% per day at 1.6 KV no-load in an ambient temperature which does not have sudden or wide temperature fluctuations.

Input - 105 to 125 V AC, 50 to 500 cps, 3.4 Amps. max., 340 watts max.

Terminals - Output: Clear plastic plate with insulated binding posts at back.
Input: Standard male AC chassis connector at back with all rubber molded power cord.

Tubes - 3 12AX7, 3 6BG6-GA, RE-1610: 3 5651. RE-1611: 2 5651.

Dimensions - 8-3/4" high by 19" wide by 12-1/2" deep overall. Cabinet alone is 10-3/4" deep.

Net Weight - 36 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLY

0.3 to 1.6 Kilovolts

200 MA MODEL RE-1620

This instrument consists of a high voltage rectifier followed by a degenerative regulator arranged to supply a closely regulated source of high voltage to a load. Either side of the output may be grounded.

The supply is completely self-contained and AC operated. It is compactly housed in a ventilated cabinet designed for either relay-rack mounting or bench use. All the operating controls are mounted on the front panel. The output terminals and input power connection are located at the back of the cabinet.

The high voltage rectifier is a full-wave silicon doubler. A minimum of filter is used in order to keep the energy storage low, and this in turn helps to make the unit more compact. The AC input to the rectifier is reduced as the output voltage is lowered, so that the power lost in the control stage of the regulator is kept down. In this way, the dependability of the regulator is improved along with its performance.

The regulator is of the degenerative series type. The control stage is tetrode operated, permitting large voltage excursions to be applied by the rectifier. A balanced two-stage high-gain differential amplifier compares part of the output voltage with a constant reference and applies the amplified voltage difference to the control stage so that the output voltage is held within narrow limits, almost independent of output load current variations or input line voltage fluctuations.

The output voltage is continuously variable over the entire range from 0.3 to 1.6 kilovolts in steps of 100 and 10 volts in conjunction with a 0 to 12 volt vernier. The voltage is changed by changing the feedback ratio to the regulator, and the amplifier gain is high enough so that the output voltage is dependent mostly upon the accuracy of the reference and the resistors used in the network. The reference uses 5651 type glow tubes for their excellent long-term performance.

The power switch is arranged so that the filaments must be turned on first. After this, the high voltage may be turned on and off without having to wait through a warm-up period.

SPECIFICATIONS

Output Voltage - 0.3 to 1.6 KV DC, continuously variable in steps of 100 and 10 volts in conjunction with a 0 to 12 volt vernier. The output voltage is within 2% of the sum of the dial settings.

Output Current - 0 to 200 milliamperes full-load.

Polarity - Either side of the output may be grounded.

Ripple - Under 2 millivolts peak to peak maximum.

Internal Impedance - Approximately 0.6 ohms at DC, no-load to full-load at 1.6 KV. At 100 cps, internal impedance is 0.1 ohm partly inductive.

Regulation - Better than .005% no-load to full-load at 1.6 KV output.

Stability - .01% or better for an input line voltage shift from 105 to 125 V AC at 1.6 KV output.

Long-term Stability - .01% per hour, 0.1% per day at 1.6 KV no-load in an ambient temperature which does not have sudden or wide temperature fluctuations.

Input - 105 to 125 V AC, 50 to 500 cps, approx. 5.5 Amps. 550 Watts max.

Terminals - Output: Clear plastic plate with insulated binding posts at back.
Input: Standard male AC chassis connector at back with all rubber molded power cord.

Tubes - 3 12AX7, 6 6BG6-GA, 3 5651.

Dimensions - 8-3/4" high by 19" wide by 16-3/8" deep overall. Cabinet alone is 13-5/8" deep.

Net Weight - 46 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

TENTATIVE SPECIFICATIONS

Model RE-1699

Output Voltage: 0.3 to 1.6 KV DC, continuously variable in steps of 100 and 10 volts in conjunction with a 0 to 12 volt vernier. The output voltage is within 2% of the sum of the dial settings.

Output Current: 0 to 1 ampere, no-load to full-load.

Polarity: Either side of the output may be grounded.

Ripple: Under 10 millivolts peak to peak maximum.

Internal Impedance: Under 0.1 ohm at full-load.

Regulation: Better than .005% no-load to full-load at 1.6 KV.

Stability: .01% or better for a line voltage shift from 200 to 240 V AC.

Long-term Stability: .02% per hour, 0.2% per day after warm-up when in a reasonable constant ambient temperature without sudden and/or wide temperature fluctuations.

Input: 200 to 240 V AC, 50 to 500 CPS, approx. 9.5 amps. max., 1800 watts max.

Terminals:

Output: Two insulated binding posts at back for each side of the output. A ground post is also provided which is connected to the chassis for convenience in grounding one side.

Input: Hubbel #5678 male AC chassis connector at back used with a detachable 3-wire rubber power cord, having Hubbel #5666 plug on one end and Hubbel #5669 female cap on the other end.

Interlock: Two terminals are also provided at the back marked "INTERLOCK" for opening high-voltage transformer primaries externally, and are connected to a standard two terminal barrier strip.

Tubes: 3 12AX7, 24 6BG6-GA, 5 5651.

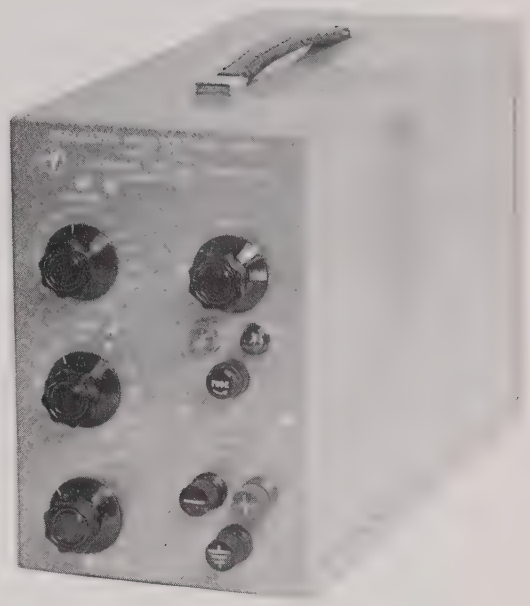
Dimensions: 22-3/4" high by 19" wide by 16" deep overall. Cabinet alone is 13-3/4" deep.

Net Weight: 140 pounds.

REGULATED HIGH VOLTAGE SUPPLY

300 to 1900 Volts

30 MA MODEL RE-1903



Uses: This supply provides a regulated output voltage over a wide range. The output voltage is stable and contains very low ripple. Either side of the output may be grounded and as much as 30 Ma. full-load current is available. The unit is small and light for easy portability so that it is very useful as a utility instrument about the laboratory or plant.

Typical uses include those in circuit development and operation with klystrons, photomultipliers, traveling wave tubes and backward wave oscillators, set ups for the determination of the characteristics of condensers, resistors, and other components, and many other problems in the laboratory and at the test position.

FEATURES

- Very wide voltage range, 300 to 1900 volts.
- Either positive or negative may be grounded.
- 30 Ma. full-load current.
- Low internal impedance, about 1 ohm.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability.
- Standard tubes: no replacement problem.
- Portable, compact, light weight.

MODEL RE-1903

Description: These instruments consist of a rectifier followed by an electronic regulator. *Either side of the output may be grounded.*

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

Long-term stability in such regulators is determined primarily by the comparison resistors in the sensitive parts of the regulator and the reference employed. Generally, deposited carbon resistors are used but wire-wound precision types can be included on special order when it is required. Type 5651 glow tubes are used for reference.

The output voltage is continuously variable over the entire range of 300 to 1900 volts. It is set by three front panel controls, the first a switch covering 300 to 1800 volts in 100 volt steps, a second covering 0 to 100 volts in 10 volt steps, and the third control a calibrated vernier with a continuous 0 to 12 volt range. The resulting output voltage is good to 2% of the sum of the dial readings.

This supply is completely AC operated and self-contained. The portable housing is ventilated and has a narrow front dimension in order to save bench space. The cover can be slipped off the unit by removing three screws. All operating controls are mounted on the front panel. The output terminals are three insulated binding posts on the front panel. The input line connection is made at the back with a detachable molded power cord. All the tubes used are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage — 300 to 1900 volts DC, ±2%, continuously variable.

Output Current — 0 to 30 Ma. full-load.

Polarity — Either side of the output may be grounded.

Ripple — 2 Mv. peak to peak maximum at line frequency.

Regulation — Better than .005% no-load to full-load at 1900 V output.

Internal Impedance — 1.0 ohm at DC, 0.15 ohms in series with approximately 40 microhenries to 1000 CPS, under 2 ohms to 1 Mc./Sec., measured at 1900 V output with 25 Ma. load.

Stability — .01% for input line voltage shift from 105 to 125 V AC at 1900 V output.

Long-term Stability — .02% per hour, 0.1% per day after warm-up at 1900 V output in a normal ambient temperature without sudden and wide temperature changes.

Input — 105 to 125 volts AC, 50 to 500 CPS 1.05 Amps. max., 103 watts max.

Terminals — Output: Insulated binding posts on the front panel.

Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit.

Tubes — 2 12AX7, 3 5651, 1 6BG6-GA.

Construction — Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

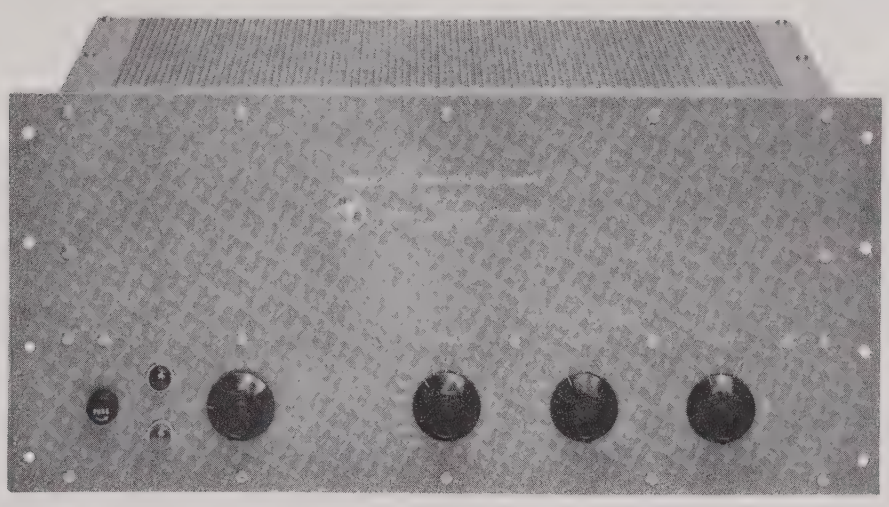
Dimensions — Cabinet is 6" wide by 9" high by 13¾" deep. Handle extends ⅝" above top, feet ⅜" below bottom, knobs and binding posts ⅞" beyond front panel.

Net Weight — 21 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLIES
500 - 2000 Volts

30 MA MODEL RE-2003
60 MA MODEL RE-2006



Uses: These supplies provide a stable and ripple-free high-voltage output over a wide range, practically independent of line voltage input or load current variations. In addition, with their ability to supply considerable current to a load of either polarity and being completely AC operated and compactly constructed, their versatility makes them particularly useful as an instrument for laboratory use and industrial application.

Typical uses include those with klystrons, traveling-wave tubes, backward-wave oscillators, cathode ray tubes, mass spectrometers, photomultipliers in scintillation counters and flying-spot scanners, and many other applications in laboratory research and development problems and in industrial control and test equipment.

FEATURES

- Wide voltage range: 500 to 2000 volts.
- Either positive or negative may be grounded.
- Useful current available.
- Low internal impedance: 1 ohm and lower at full-load.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability: .01% per hour, 0.1% per day.
- Standard tubes: no replacement problem.
- Compact: designed for rack or bench use.

NORTHEAST SCIENTIFIC CORPORATION

MODEL RE-2003
MODEL RE-2006

Description: These instruments consist of a rectifier followed by an electronic regulator. Either side of the output may be grounded.

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

With such a regulator long-term stability is determined mostly by the comparison resistors and reference tubes. For the very best performance wire-wound resistors are recommended, but for most applications, deposited carbon resistors give very good performance. The use of 5651 reference tubes strikes a good balance between performance, availability, and cost.

The output voltage is continuously variable over the entire range of 500 to 2000 volts. It is set by three front panel controls, two step switches and a vernier so that the resulting output voltage is good to better than 2% of the sum of the dial readings.

These supplies are completely AC operated and self-contained. The housing is well ventilated and designed for either rack or bench use. All operating controls are mounted on the front panel. Input and output connections are made at the back. All tubes are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage — 500 to 2000 volts DC, ±2%, continuously variable.

Output Current — RE-2003: 0 to 30 Ma., full-load.
RE-2006: 0 to 60 Ma., full-load.

Polarity — Either side of the output may be grounded.

Ripple — 2 Mv. peak to peak maximum at line frequency.

Regulation — .005% no-load to full-load at 2000 v output.

Internal Impedance — 1 ohm at DC, 0.2 ohms in series with 25 microhenries to 2000 CPS, under 2 ohms to 1 Mc/Sec., under 25 Ma. load at 2000 V output.

Stability — .01% or better for input line voltage shift from 105 to 125 V AC at 2000 V output.

Long-term Stability — .01% per hour, 0.1% per day after warm-up at 2000 V output in a normal ambient temperature without sudden and wide temperature changes.

Input — 105 to 125 volts AC, 50 to 500 CPS.
RE-2003: 1.1 Amp. max., 110 Watts max.
RE-2006: 2.1 Amp. max., 220 Watts max.

Terminals — Output: Clear plastic plate with insulated binding posts at back.

Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit.

Tubes — 3 12AX7, 5 5651. RE-2003: 1 6BG6-GA.
RE-2006: 2 6BG6-GA.

Construction — Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

Dimensions — 19" wide by 8¾" high 12⅜" overall. Cabinet depth is 10⅝"

Net Weight — RE-2003: 25 pounds.
RE-2006: 30 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLIES

500 - 2000 Volts

150 MA MODEL RE-2015

Uses: These supplies provide a stable and ripple-free high-voltage output over a wide range, practically independent of line voltage input or load current variations. In addition, with their ability to supply considerable current to a load of either polarity and being completely AC operated and compactly constructed, their versatility makes them particularly useful as an instrument for laboratory use and industrial application.

Typical uses include those with klystrons, traveling-wave tubes, backward-wave oscillators, cathode ray tubes, mass spectrometers, photomultipliers in scintillation counters and flying-spot scanners, and many other applications in laboratory research and development problems and in industrial control and test equipment.

FEATURES

- Wide voltage range: 500 to 2000 volts.
- Either positive or negative may be grounded.
- Useful current available.
- Low internal impedance: 1 ohm and lower at full-load.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability: .01% per hour, 0.1% per day.
- Standard tubes: no replacement problem.
- Compact: designed for rack or bench use.

MODEL RE-2015

Description: These instruments consist of a rectifier followed by an electronic regulator. Either side of the output may be grounded.

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

With such a regulator long-term stability is determined mostly by the comparison resistors and reference tubes. For the very best performance wire-wound resistors are recommended, but for most applications, deposited carbon resistors give very good performance. The use of 5651 reference tubes strikes a good balance between performance, availability, and cost.

The output voltage is continuously variable over the entire range of 500 to 2000 volts. It is set by three front panel controls, two step switches and a vernier so that the resulting output voltage is good to better than 2% of the sum of the dial readings.

These supplies are completely AC operated and self-contained. The housing is well ventilated and designed for either rack or bench use. All operating controls are mounted on the front panel. Input and output connections are made at the back. All tubes are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage - 500 to 2000 volts DC, ±2%, continuously variable.

Output Current - 0 to 150 Ma., full load.

Polarity - Either side of the output may be grounded.

Ripple - 2 Mv. peak to peak maximum at line frequency.

Regulation - .005% no-load to full-load at 2000 V output.

Internal Impedance - 1 ohm at DC, 0.2 ohms in series with 25 microhenries to 2000 CPS, under 2 ohms to 1 Mc/Sec., measured at full load at 2000 V output.

Stability - .01% or better for input line voltage shift from 105 to 125 V AC at 2000 V output.

Long-term Stability - .01% per hour, 0.1% per day after warm-up at 2000 V output in a normal ambient temperature without sudden and wide temperature changes.

Input - 105 to 125 volts AC, 50 to 500 CPS. 5 Amp. max., 525 Watts max.

Terminals - Output: Phenolic plate with insulated binding posts at back.

Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit

Tubes - 3 12AX7, 6 6BG6-GA, 5 5651

Construction - Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

Dimensions - 19" wide by 8¾" high 16-3/8" overall. Cabinet depth is 13-5/8".

Net Weight - 51 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

TENTATIVE SPECIFICATIONS

Model RE-2060

Output Voltage: 0.5 to 2.0 KV DC, continuously variable in steps of 100 and 10 volts in conjunction with a 0 to 12 volt vernier. The output voltage is within 2% of the sum of the dial settings.

Output Current: 0 to 600 milliamperes, no-load to full-load.

Polarity: Either side of the output may be grounded.

Ripple: Under 10 millivolts peak to peak maximum.

Internal Impedance: Under 0.1 ohm at full-load.

Regulation: Better than .005% no-load to full-load at 1.6 KV.

Stability: .01% or better for a line voltage shift from 200 to 240 V AC.

Long-term Stability: .02% per hour, 0.2% per day after warm-up when in a reasonable constant ambient temperature without sudden and/or wide temperature fluctuations.

Input: 200 to 240 V AC, 50 to 500 CPS, approx. 9.5 amps. max., 1800 watts max.

Terminals:

Output: Two insulated binding posts at back for each side of the output. A ground post is also provided which is connected to the chassis for convenience in grounding one side.

Input: Hubbel #5678 male AC chassis connector at back used with a detachable 3-wire rubber power cord, having Hubbel #5666 plug on one end and Hubbel #5669 female cap on the other end.

Interlock: Two terminals are also provided at the back marked "INTERLOCK" for opening high-voltage transformer primaries externally, and are connected to a standard two terminal barrier strip.

Tubes 3 12AX7, 24 6BG6-GA, 5 5651.

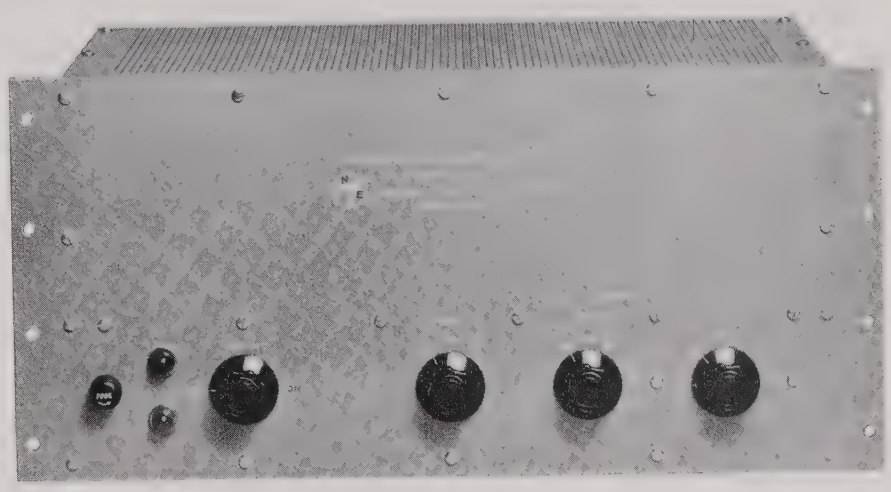
Dimensions: 22-3/4" high by 19" wide by 16" deep overall. Cabinet alone is 13-3/4" deep.

Net Weight: 140 pounds.

REGULATED HIGH VOLTAGE SUPPLIES

500 - 3000 Volts

20 MA	MODEL RE-3002
40 MA	MODEL RE-3004
60 MA	MODEL RE-3006



Uses: These supplies provide a stable and ripple-free high-voltage output over a wide range, practically independent of line voltage input or load current variations. In addition, with their ability to supply considerable current to a load of either polarity and being completely AC operated and compactly constructed, their versatility makes them particularly useful as an instrument for laboratory use and industrial application.

Typical uses include those with klystrons, traveling-wave tubes, backward-wave oscillators, cathode ray tubes, mass spectrometers, photomultipliers in scintillation counters and flying-spot scanners, and many other applications in laboratory research and development problems and in industrial control and test equipment.

FEATURES

- Very wide voltage range: 500 to 3000 volts.
- Either positive or negative may be grounded.
- 20, 40, or 60 Ma. full-load current.
- Low internal impedance: under 2 ohms at full-load.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability: .01% per hour, 0.1% per day.
- Standard tubes: no replacement problem.
- Compact: designed for rack or bench use.

NORTHEAST SCIENTIFIC CORPORATION

MODEL RE-3002
MODEL RE-3004
MODEL RE-3006

Description: These instruments consist of a rectifier followed by an electronic regulator. Either side of the output may be grounded.

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

With such a regulator long-term stability is determined mostly by the comparison resistors and reference tubes. For the very best performance wire-wound resistors are recommended, but for most applications, deposited carbon resistors give very good performance. The use of 5651 reference tubes strikes a good balance between performance, availability, and cost.

The output voltage is continuously variable over the entire range of 500 to 3000 volts. It is set by three front panel controls, the first a switch covering 500 to 2500 volts in 500 volt steps, a second covering 0 to 500 volts in 50 volt steps, and the third control a calibrated vernier with a continuous 0 to 60 volt range. The resulting output voltage is good to or better than 2% of the sum of the dial readings.

These supplies are completely AC operated and self-contained. The housing is well ventilated and designed for either rack or bench use. All operating controls are mounted on the front panel. Input and output connections are made at the back. All tubes are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage — 500 to 3000 volts DC, ±2%, continuously variable.

Output Current — RE-3002: 0 to 20 Ma., full-load.
RE-3004: 0 to 40 Ma., full-load.
RE-3006: 0 to 60 Ma., full-load.

Polarity — Either side of the output may be grounded.

Ripple — 2 Mv. peak to peak maximum at line frequency.

Regulation — Better than .005% no-load to full-load at 3000 v output.

Internal Impedance — 2 ohms at DC, 0.3 ohms in series with approximately 45 microhenries to 2000 CPS, under 2.5 ohms to 1 Mc./Sec., measured at 3000 v output with 20 Ma. load.

Stability — .01% or better for input line voltage shift from 105 to 125 V AC at 3000 V output.

Long-term Stability — .01% per hour, 0.1% per day after warm-up at 3000 v output in a normal ambient temperature without sudden and wide temperature changes.

Input — 105 to 125 volts AC, 50 to 70 CPS.
RE-3002: 1.3 Amp. max., 130 watts max.
RE-3004: 2.4 Amp. max., 235 watts max.
RE-3006: 4 Amp. max., 350 watts max.

Terminals — Output: Phenolic plate with insulated binding posts at back. If plate is removed, an output socket is available, permitting a completely covered cable and plug to be used, if desired.

Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit.

Tubes — RE-3002: 5 5651, 3 12AX7, 1 6BG6-GA.
RE-3004: 5 5651, 3 12AX7, 2 6BG6-GA.
RE-3006: 5 5651, 3 12AX7, 3 6BG6-GA.

Construction — Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

Dimensions — 19" wide by 8¾" high 12⅜" overall. Cabinet depth is 10⅝"

Net Weight — RE-3002: 26 pounds.
RE-3004: 32 pounds.
RE-3006: 33 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLIES

500 - 3000 Volts

100 MA MODEL RE-3010

Uses: This supply provides a stable and ripple-free high-voltage output over a wide range, practically independent of line voltage input or load current variations. Compactly constructed and completely AC operated, and with the ability to supply considerable current to a load of either polarity, this is a particularly useful instrument for laboratory use and industrial application.

Typical uses include those with klystrons, traveling-wave tubes, backward-wave oscillators, cathode ray tubes, mass spectrometers, photomultipliers in scintillation counters and flying-spot scanners, and many other applications in laboratory research and development problems and in industrial control and test equipment.

FEATURES

- Very wide voltage range: 500 to 3000 volts.
- Either positive or negative may be grounded.
- 100 Ma. full-load current.
- Low internal impedance: under 2 ohms at full-load.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability: .01% per hour, 0.1% per day.
- Standard tubes: no replacement problem.
- Compact: designed for rack or bench use.

Description: This instrument consists of a rectifier followed by an electronic regulator. Either side of the output may be grounded.

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

With such a regulator long-term stability is determined mostly by the comparison resistors and reference tubes. For the very best performance wire-wound resistors are recommended, but for most applications, deposited carbon resistors give very good performance. The use of 5651 reference tubes strikes a good balance between performance, availability, and cost.

The output voltage is continuously variable over the entire range of 500 to 3000 volts. It is set by three front panel controls, the first a switch covering 500 to 2500 volts in 500 volt steps, a second covering 0 to 500 volts in 50 volt steps, and the third control a calibrated vernier with a continuous 0 to 60 volt range. The resulting output voltage is good to or better than 2% of the sum of the dial readings.

These supplies are completely AC operated and self-contained. The housing is well ventilated and designed for either rack or bench use. All operating controls are mounted on the front panel. Input and output connections are made at the back. All tubes are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage - 500 to 3000 volts DC, ±2%, continuously variable.

Output Current - 0 to 100 Ma., full-load.

Polarity - Either side of the output may be grounded.

Ripple - 2 Mv. peak to peak maximum at line frequency.

Regulation - Better than .005% no-load to full-load at 3000 V output.

Internal Impedance - 2 ohms at DC, 0.3 ohms in series with approximately 45 microhenries to 2000 CPS, under 2.5 ohms to 1 Mc./Sec., measured at 3000 V output with 20 Ma. load.

Stability - .01% or better for input line voltage shift from 105 to 125 V AC at 3000 V output.

Long-term Stability - .01% per hour, 0.1% per day after warm-up at 3000 V output in a normal ambient temperature without sudden and/or wide temperature changes.

Input - 105 to 125 volts AC, 50 to 70 CPS, 5.5 Amps. max., 550 watts max.

Terminals - Output: Phenolic plate with insulated binding posts at back. If plate is removed, an output socket is available, permitting a completely covered cable and plug to be used, if desired.
Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit.

Tubes - 5 5651, 6 12AX7, 1 6BG6-GA.

Construction - Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

Dimensions - 19" wide by 8-3/4" high 16-3/8" overall. Cabinet depth is 13-5/8".

Net Weight - 46 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

TENTATIVE SPECIFICATIONS

Model RE-3040

Output Voltage: 0.5 to 3 KV DC, continuously variable in steps of 500 and 50 volts in conjunction with a 0 to 60 volt vernier. Output is the sum of the dial settings to within 2%.

Output Current: 0 to 400 milliamperes, full-load.

Polarity: Either side of the output may be grounded.

Ripple: Less than 10 millivolts peak to peak.

Regulation: Better than .005% no-load to full-load at 3 KV output.

Internal Impedance: Under 0.1 ohm at full-load.

Stability: .01% or better for a line voltage shift from 200 to 240 V AC.

Long-term Stability: .02% per hour, 0.2% per day after warm-up when in a reasonable constant ambient temperature without sudden and/or wide temperature fluctuations.

Input: 200 to 240 V AC, 50 to 500 CPS, approx. 9.5 amps. max., 1800 watts max.

Terminals:

- Output: Two insulated binding posts at back for each side of the output. A ground post is also provided which is connected to the chassis for convenience in grounding one side.
- Input: Hubbel #5678 male AC chassis connector at back used with a detachable 3-wire rubber power cord, having Hubbel #5666 plug on one end and Hubbel #5669 female cap on the other end.
- Interlock: Two terminals are also provided at the back marked "INTERLOCK" for opening high-voltage transformer primaries externally, and are connected to a standard two terminal barrier strip.

Tubes: 3 12AX7, 24 6BG6-GA, 5 5651.

Dimensions: 22-3/4" high by 19" wide by 16" deep overall. Cabinet alone is 13-3/4" deep.

Net Weight: 140 pounds.

REGULATED HIGH VOLTAGE SUPPLY

0.5 to 5.0 Kilovolts

10 MA MODEL RE-5001

20 MA MODEL RE-5002

These instruments consist of a high voltage rectifier followed by a degenerative regulator arranged to supply a closely regulated source of high voltage to a load. Either side of the output may be grounded.

The supply is completely AC operated and self contained. It is compactly housed in a ventilated cabinet designed for relay-rack or bench use. All the operating controls are mounted on the front panel. The output terminals, the input power receptacle for the power cord and the interlock terminals are located at the back of the instrument.

The power switch is arranged so that the filaments must be turned on first. After this, the high voltage may be turned on and off without having to wait for a warm-up period.

The high voltage rectifier is a full-wave silicon doubler. A minimum of filter is used in order to keep the energy storage low. The AC voltage input to the rectifier is reduced as the output voltage is lowered, so that the power dissipated in the regulator is kept down.

The regulator is of the degenerative series type. The control stage is operated as a tetrode, permitting large plate voltage excursions to be applied by the rectifier. A two-stage balanced high-gain differential amplifier compares part of the output voltage with a constant reference and applies the amplified voltage difference to the control stage so that the output voltage is held within narrow limits, almost independent of output load current or input line voltage effects.

The output voltage is continuously adjustable over the entire range from .5 to 5.0 KV, and it is changed by varying the feedback ratio. The ratio is changed by switching precision resistors, and the output voltage calibration is about as accurate as the resistors and the reference source used. Type 5651's are used as reference.

SPECIFICATIONS

Output Voltage - 0.5 to 5.0 KV DC, continuously variable in 500 and 50 volt steps in conjunction with a 0 to 60 volt vernier. Output within 2% of the sum of the dial settings.

Output Current - RE-5001: 0 to 10 Ma., full-load.
RE-5002: 0 to 20 Ma., full-load.

Polarity - Either side of the output may be grounded.

Ripple - Less than 2 millivolts peak to peak.

Regulation - Better than .002% no-load to full-load at 5 KV output.

Internal Impedance - Under 1 ohm at DC, about 0.2 ohms in series with approximately 40 microhenries to 2000 CPS, under 5 ohms to 1 Mc./Sec. at 5 KV.

Stability - .005% or better for line voltage shift from 105 to 125 V AC at 5 KV output.

Long-term Stability - .01% per hour, 0.1% per day in a reasonably constant ambient temperature without wide and sudden temperature changes.

Input - 105 to 125 V AC, 50 to 70 CPS.
RE-5001: 1.3 Amp. max., 125 Watts max.
RE-5002: 2.3 Amp. max., 235 Watts max.

Terminals - Output: Clear plastic plate with insulated binding posts at back.
Input: Standard male AC chassis connector at back with all rubber molded power cord.

Tubes - 3 12AX7, 5 5651. RE-5001: 1 6BG6-GA.
RE-5002: 2 6BG6-GA.

Dimensions - 8-3/4" high by 19" wide by 12-1/2" deep overall. Cabinet alone is 10-3/4" Deep.

Net Weight - RE-5001: 28 pounds.
RE-5002: 37 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLY

0.5 to 5.0 Kilovolts
1.0 to 5.5 Kilovolts
1.5 to 6.0 Kilovolts

30 MA

MODEL RE-5003
MODEL RE-5503
MODEL RE-6003

Uses: This supply combines very high output voltage and 30 Ma. full-load current rating with excellent performance in a compact form. Either side of the output may be grounded. The output voltage is very stable and ripple free over the entire range, practically independent of input line voltage or output load current variations. Since the supply is completely AC operated, its versatility makes it especially useful for laboratory work and industrial application.

Typical uses include those with klystrons, traveling-wave tubes, backward-wave oscillators, cathode ray tubes, mass spectrometers, photomultipliers in scintillation counters and flying-spot scanners, and many other applications in laboratory research and development problems and in industrial control and test equipment.

FEATURES

- Wide voltage range.
- Either positive or negative may be grounded.
- 30 milliampere full-load current rating.
- Low internal impedance: 1 ohm and lower at full-load.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability: .02% per hour, 0.2% per day.
- Standard tubes: no replacement problem.
- Compact: designed for rack or bench use.

NORTHEAST SCIENTIFIC CORPORATION

MODEL RE-5003
MODEL RE-5503
MODEL RE-6003

Description: These instruments consist of a rectifier followed by an electronic regulator. *Either side of the output may be grounded.*

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

With such a regulator long-term stability is determined mostly by the comparison resistors and reference tubes. For the very best performance wire-wound resistors are recommended, but for most applications, deposited carbon resistors give very good performance. The use of 5651 reference tubes strikes a good balance between performance, availability, and cost.

The output voltage is continuously variable over the entire range. It is set by three front panel controls, two step switches and a vernier so that the resulting output voltage is good to better than 2% of the sum of the dial readings.

These supplies are completely AC operated and self-contained. The housing is well ventilated and designed for either rack or bench use. All operating controls are mounted on the front panel. Input and output connections are made at the back. All tubes are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage— 0.5 to 5.0 kilovolts DC, 1.0 to 5.5 kilovolts DC, and 1.5 to 6.0 kilovolts DC, ±2%, continuously variable.

Output Current — 0 to 30 Ma., full-load. full-load.

Polarity — Either side of the output may be grounded.

Ripple — 2 Mv. peak to peak maximum at line frequency.

Regulation — .005% or better, no-load to full-load at 5.5 Kv. output.

Internal Impedance — About 1 ohm at DC, .05 ohm in series with approximately 33 microhenries to 2000 CPS, under 3 ohms to 1 Mc./Sec., measured at 5.0 Kv. output with 25 Ma. load.

Stability — .01% or better for input line voltage shift from 105 to 125 V AC at 5.5 Kv. output.

Long-term Stability — Better than .02% per hour, 0.2% per day after warm-up at 5.0 Kv. output in a normal ambient temperature without sudden and wide temperature changes.

Input — 105 to 125V AC, 50 to 500 CPS line frequency, 3.2 Amps. max., 330 watts max.

Terminals — **Output:** Phenolic plate with insulated binding posts at back.

Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit.

Tubes — 3 12AX7, 1 6FW5, 1 4-65A, 5 5651.

Construction — Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

Dimensions — 8¾" high by 19" wide by 16" deep overall. Cabinet is 14 5/16" deep.

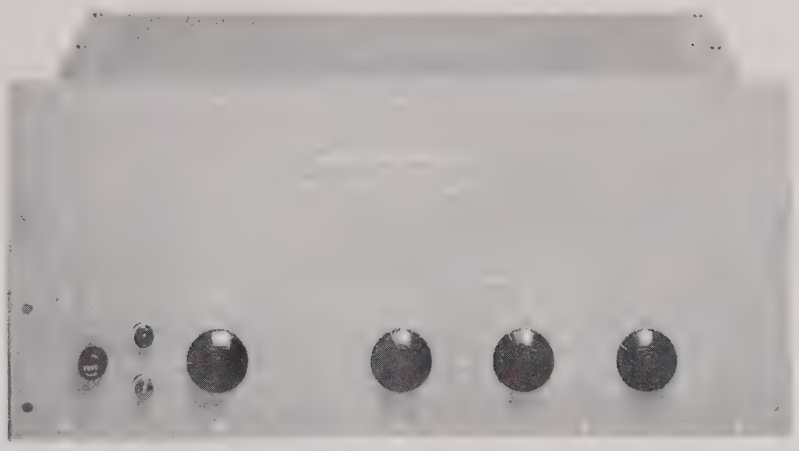
Net Weight — 49 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

REGULATED HIGH VOLTAGE SUPPLY

0.5 to 5.0 Kilovolts

60 MA MODEL RE-5006



These instruments consist of a high voltage rectifier followed by a degenerative regulator arranged to supply a closely regulated source of high voltage to a load. Either side of the output may be grounded.

The supply is completely AC operated and self contained. It is compactly housed in a ventilated cabinet designed for relay-rack or bench use. All the operating controls are mounted on the front panel. The output terminals, the input power receptacle for the power cord and the interlock terminals are located at the back of the instrument.

The power switch is arranged so that the filaments must be turned on first. After this, the high voltage may be turned on and off without having to wait for a warm-up period.

The high voltage rectifier is a full-wave silicon doubler. A minimum of filter is used in order to keep the energy storage low. The AC voltage input to the rectifier is reduced as the output voltage is lowered, so that the power dissipated in the regulator is kept down.

The regulator is of the degenerative series type. The control stage is operated as a tetrode, permitting large plate voltage excursions to be applied by the rectifier. A two-stage balanced high-gain differential amplifier compares part of the output voltage with a constant reference and applies the amplified voltage difference to the control stage so that the output voltage is held within narrow limits, almost independent of output load current or input line voltage effects.

The output voltage is continuously adjustable over the entire range from .5 to 5.0 KV, and it is changed by varying the feedback ratio. The ratio is changed by switching precision resistors, and the output voltage calibration is about as accurate as the resistors and the reference source used. Type 5651's are used as reference.

SPECIFICATIONS

Output Voltage - 0.5 to 5.0 KV DC, continuously variable in 500 and 50 volt steps in conjunction with a 0 to 60 volt vernier. Output within 2% of the sum of the dial settings.

Output Current - 0 to 60 Ma., full load.

Polarity - Either side of the output may be grounded.

Ripple - Less than 2 millivolts peak to peak.

Regulation - Better than .003% no-load to full-load at 5 KV output.

Internal Impedance - Under 1 ohm at DC, about 0.2 ohms in series with approximately 40 microhenries to 2000 cps, under 5 ohms to 1 Mc./Sec. at 5 KV.

Stability - .01% or better for line voltage shift from 105 to 125 V AC at 5 KV output.

Long-term Stability - .02% per hour, 0.2% per day in a reasonably constant ambient temperature without wide and sudden temperature changes.

Input - 105 to 125 V AC, 50 to 500 CPS. 5 Amp. max., 550 Watts max.

Terminals - Output: Clear plastic plate with insulated binding posts at back.
Input: Standard male AC chassis connector at back with all rubber molded power cord.

Tubes - 3 12AX7, 5 5651, 1 6AV5, 2 4-65A.

Dimensions - 8-3/4" high by 19" wide by 16-3/8" deep overall. Cabinet alone is 13-5/8" deep.

Net Weight - 48 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

TENTATIVE SPECIFICATIONS

Model RE-5020

Output Voltage: 0.5 to 5.0 KV DC, continuously variable in steps of 500 volts and 50 volts in conjunction with a 0 to 60 volt vernier. Output is the sum of the dial settings to within 2%.

Output Current: 0 to 200 milliamperes, full-load.

Polarity: Either side of the output may be grounded.

Ripple: Less than 10 millivolts peak to peak.

Regulation: Better than .005% no-load to full-load at 5 KV output.

Internal Impedance: Under 0.1 ohm at full-load.

Stability: .01% or better for a line voltage shift from 200 to 240 V AC.

Long-term Stability: .02% per hour, 0.2% per day after warm-up when in a reasonable constant ambient temperature without sudden and/or wide temperature fluctuations.

Input: 200 to 240 V AC, 50 to 500 CPS, approx. 9.5 amps. max., 1800 watts max.

Terminals:
- Output: Two insulated binding posts at back for each side of the output. A ground post is also provided which is connected to the chassis for convenience in grounding one side.
- Input: Hubbel #5678 male AC chassis connector at back used with a detachable 3-wire rubber power cord, having Hubbel #5666 plug on one end and Hubbel #5669 female cap on the other end.
- Interlock: Two terminals are also provided at the back marked "INTERLOCK" for opening high-voltage transformer primaries externally, and are connected to a standard two terminal barrier strip.

Tubes: 3 12AX7, 2 6FW5, 6 4-65A, 5 5651.

Dimensions: 22-3/4" high by 19" wide by 16" deep overall. Cabinet alone is 13-3/4" deep.

Net Weight: 140 pounds.

REGULATED HIGH VOLTAGE SUPPLY — 10 MA — MODEL RE-10010

1 - 10 Kilovolts

USES: This supply provides a stable and ripple-free high-voltage output over a wide range, practically independent of line voltage input or load current variations. In addition, its ability to supply considerable current to a load of either polarity and the fact that it is completely AC operated and compactly constructed, result in a versatility that makes it particularly useful as an instrument for laboratory use and industrial application.

Typical uses include those with klystrons, traveling-wave tubes, backward-wave oscillators, cathode ray tubes, mass spectrometers, photomultipliers in scintillation counters and flying-spot scanners, and many other applications in laboratory research and development problems and in industrial control and test equipment.

FEATURES

- Very wide voltage range: 1 to 10 kilovolts.
- Either positive or negative may be grounded.
- 10 Ma. full-load current.
- Low internal impedance: of the order of 10 ohms at full-load.
- Excellent regulation: better than .005% no-load to full-load.
- High stability: better than .01% for 20% line voltage shift.
- Good long-term stability: .02% per hour, .25% per day.
- Standard tubes: no replacement problem.
- Compact: designed for rack or bench use.

DESCRIPTION: This instrument consists of a rectifier followed by an electronic regulator. Either side of the output may be grounded.

The rectifier is a voltage doubler operating at the input line frequency and using silicon cells for simplicity and dependable performance.

The regulator is of the degenerative series type. A tetrode control stage used in conjunction with a two-stage balanced differential feedback amplifier closely regulates the output voltage so that it is practically independent of input line voltage variations or output load effects. Residual line frequency ripple is very low. Internal impedance is of the order of ohms.

With such a regulator long-term stability is determined mostly by the comparison resistors and reference tubes. The deposited carbon resistors used give very good performance. The use of 5651 reference tubes strikes a good balance between performance, availability, and cost.

The output voltage is continuously variable over the entire range of 1 to 10 kilovolts. It is adjusted by four front panel controls, the first a range switch for 1-5.5 KV and 5.5-10 KV, the second calibrated for 1-5 KV and 5.5-9.5 KV in 0.5 KV steps, the third covering 0 to 500 volts in 50 volt steps, and the fourth control a calibrated vernier with a continuous 0 to 60 volt range. The resulting output voltage is good to or better than 2% of the sum of the dial readings.

These supplies are completely AC operated and self-contained. The housing is well ventilated and designed for either rack or bench use. All operating controls are mounted on the front panel. Input and output connections are made at the back. All tubes are popular types for which there will be no procurement problem.

SPECIFICATIONS

Output Voltage - 1 to 10 kilovolts DC, ±2%, continuously variable.

Output Current - 0 to 10 Ma., full-load.

Polarity - Either side of the output may be grounded.

Ripple - 10 Mv. peak to peak maximum at line frequency.

Regulation - Better than .005% no-load to full-load at 10 KV output.

Internal Impedance - Of the order of 10 ohms at DC no-load to full-load at 10 KV DC output.

Stability - .01% or better for input line voltage shift from 105 to 125 V AC at 10 KV output.

Long-term Stability - .02% per hour, .25% per day after warm-up at 10 KV output in a normal ambient temperature without sudden and wide temperature changes.

Input - 105 to 125 volts AC, 60 CPS.
2.4 Amp. max., 260 watts max.

Terminals - Output: Phenolic plate with insulated binding posts at back.
Input: Standard male AC chassis connector at back. A detachable all rubber molded power cord supplied with the unit.

Tubes - 5 5651, 3 12AX7, 1 6V6-GT, 1 25T (Eimac).

Construction - Ventilated cabinet mounted on rack panel suitable for rack mounting or bench use. Gray hammertone finish with white marking. All operating controls mounted on the front panel away from output connections at back.

Dimensions - 19" wide by 8-3/4" high 16-3/8" overall. Cabinet depth is 13-5/8".

Net Weight - 38 pounds.

NORTHEAST SCIENTIFIC CORPORATION
30 WETHERBEE ST. ACTON, MASS.

Model RE-10100

SPECIFICATIONS

Output Voltage: 1 to 10 KV DC, continuously variable in steps of 500 and 50 volts in conjunction with a 0-60 volt vernier over two ranges of 1-5.5 KV and 5.5-10 KV. Output is the sum of the dial settings to 2%.

Output Current: 0 to 100 milliamperes, full-load.

Polarity: Either side of the output may be grounded.

Ripple: 1-5.5 KV range - 6 Mv. peak to peak max.
5.5-10 KV range - 45 Mv. peak to peak max.

Regulation: Better than .005% no-load to full-load at 10 KV.

Internal Impedance: Of the order of 3 ohms at DC no-load to full-load at 10 KV.

Stability: .01% or better for a line voltage shift from 200 V to 240 V AC at 10 KV DC output.

Long-term Stability: About .02% per hour and .25% per day in a reasonable constant ambient temperature without wide and/or sudden temperature changes.

Input: 200-240 V AC, 50 to 500 CPS, 9.5 amps. max., 1800 watts max.

Terminals:
- Output: Two insulated binding posts at back for each side of the output. A ground post is also provided which is connected to the chassis for convenience in grounding one side.
- Input: Hubbel #5678 male AC chassis connector at back used with a detachable 3-wire rubber power cord, having Hubbel #5666 plug on one end and Hubbel #5669 female cap on the other end.
- Interlock: Two terminals are also provided at the back marked "INTERLOCK" for opening high-voltage transformer primaries externally, and are connected to a standard two terminal barrier strip.

Tubes: 3 12AX7, 1 6FW5, 6 4-65A(Eimac), 5 5651.

Dimensions: 22-3/4" high by 19" wide by 16" deep overall. Cabinet alone is 13-3/4" deep.

Net Weight: 140 pounds.

CONSTANT CURRENT SUPPLY

0 to 230 Ma.

MODEL RI-234

This instrument consists of a high-voltage rectifier followed by a degenerative regulator so arranged that a very constant current can be supplied to a load. Output is available at two different places from the regulator, and any one of the four terminals can be grounded.

The supply is completely AC operated and self-contained. An auxiliary regulated supply is included for the proper operation of the constant-current regulator, and it is operated in conjunction with it. All of the supply is compactly housed in a ventilated cabinet designed for relay-rack or bench use. All operating controls are mounted on the front panel. The output terminals and the input connection for the power cord are located at the back of the cabinet.

The power switch is arranged so that the filament circuits are activated first. After a short warm-up period, the regulator may be turned on and off without having to wait through a warm-up period. The output current can be set or adjusted to the desired operating value by the four controls calibrated in milliamperes. The calibration should be within plus or minus 2% of the sum of the dial settings, and is generally about 1% or better. The output voltage will accommodate itself to the load being fed and can be any value from 0 to full-load.

The main high-voltage rectifier is a full-wave silicon bridge rectifier. The regulator is sufficiently stiff so that the filter can be modest and simple.

The regulator itself is of the degenerative series type. The control stage is operated as a tetrode, permitting large plate excursions and low voltage drops across the control tubes. A two-stage balanced high-gain differential amplifier compares the voltage drop caused by the output current flowing through a standard resistor with a constant reference voltage and applies the amplified voltage difference to the control stage so that the output current is held within very narrow limits, practically independent of output load voltage variations and input line voltage fluctuations. The resulting internal impedance is above 10 megohms.

The output current is continuously variable over the entire range from 0 to 230 milliamperes. The output current is varied by adding precision resistors in parallel, each resistor determining its share of output current, since the voltage drop across them is held constant by the regulator.

SPECIFICATIONS

Output Current - 0 to 230 Ma. DC, variable in 10, 1, 0.1 and .01 milliampere steps with the operating current equal to the sum of the dial settings. Output current within ±2% of the setting.

Output Voltage - 0 to 350 volts minimum. Accompanying curves show regions of operation for output voltages above 365 volts.

Polarity - Either side of the output may be grounded.

Ripple - About .001% for currents over 0.1 Ma.

Regulation - .002% no-load to full-load (0 to 400 volts) at 200 Ma. output current.

Internal Impedance - 200 megohms measured at DC at 231 Ma. output.

Stability - Output current is stable to .03% for a line voltage shift from 105 to 125 volts AC.

Long-term Stability - .01% per hour after warm-up in a normal ambient temperature without wide and sudden temperature fluctuations.

Input - 105 to 125 volts AC, 50 to 500 CPS, 2.2 Amps max., 225 watts max.

Terminals - Output: Phenolic plate with insulated binding posts.
Input: Standard male AC chassis connector with all rubber molded power cord.

Tubes - 4 12AX7, 1 6BQ7, 1 6AU6, 5 6L6-GB, 1 6S4, 3 5651

Dimensions - 8 3/4" high by 19" wide by 12 1/2" deep overall. Cabinet alone is 10 3/4" deep.

Net Weight - 30 pounds.

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